

# Device Modeling Report

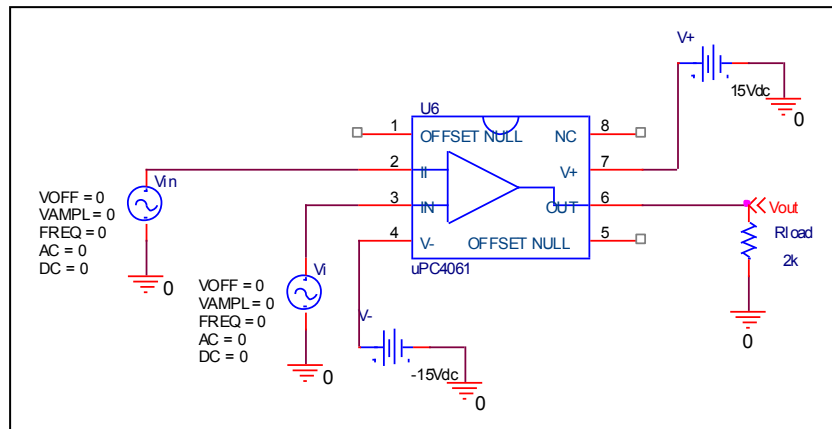
COMPONENTS:MOSFET: OPERATIONAL AMPLIFIER  
PART NUMBER:uPC4061C  
MANUFACTURER: NEC ELECTRONICS



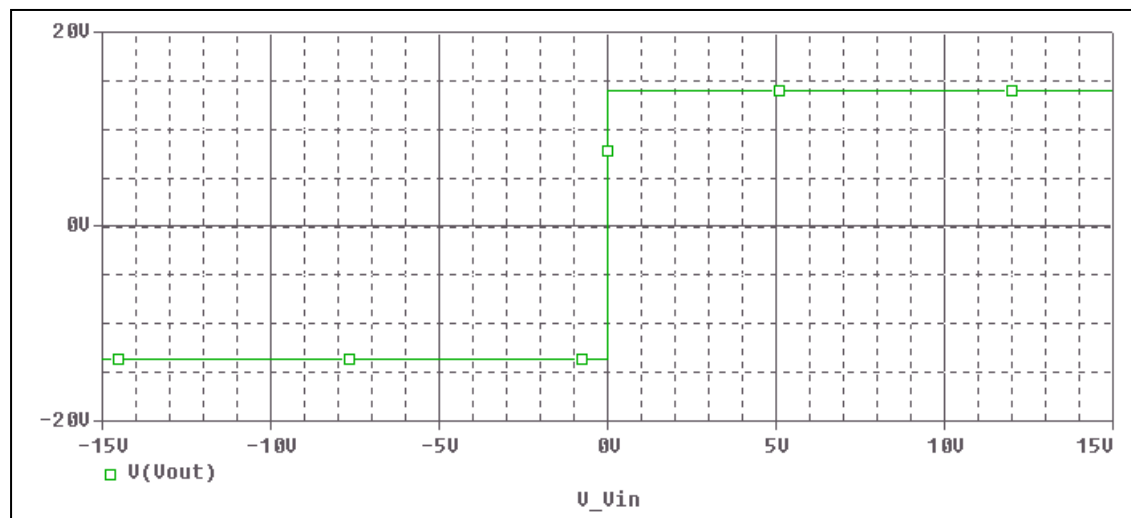
Bee Technologies Inc.

## Output Voltage Swing, +Vout and -Vout

### Evaluation circuit



### Simulation result

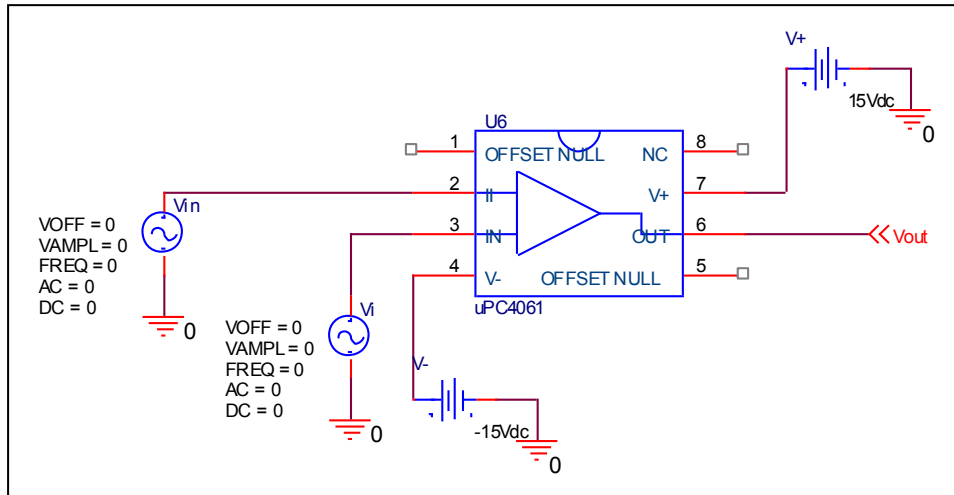


These simulation results are compared with  $\pm V_{out}$

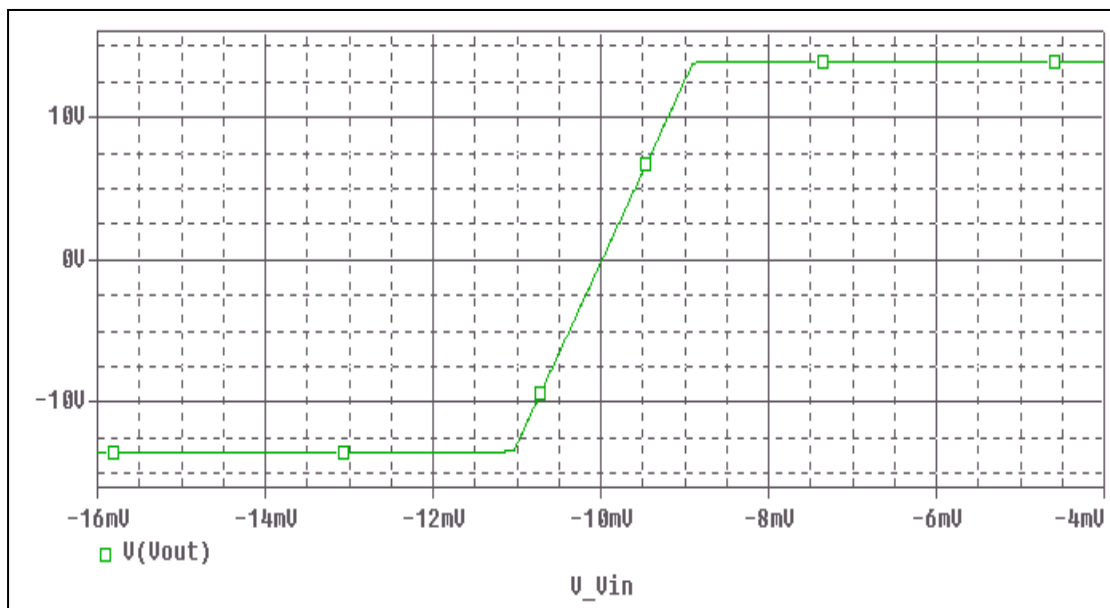
Output Voltage Swing	Data sheet	Simulation	%Error
+Vout(V)	+14	+13.972	0.2
-Vout(V)	-13.6	-13.572	0.205882353

# Input Offset Voltage

## Evaluation circuit



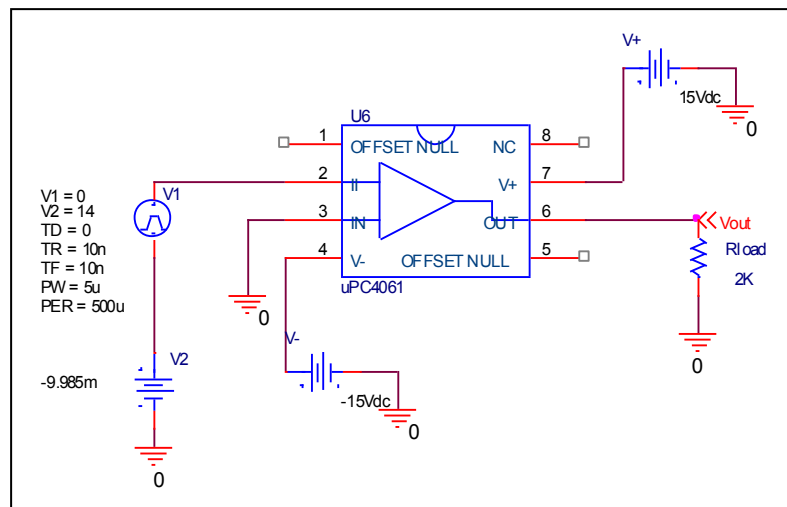
## Simulation result



Vos	Measurement		Simulation		Error	
	10	mV	9.985	mV	0.15	%

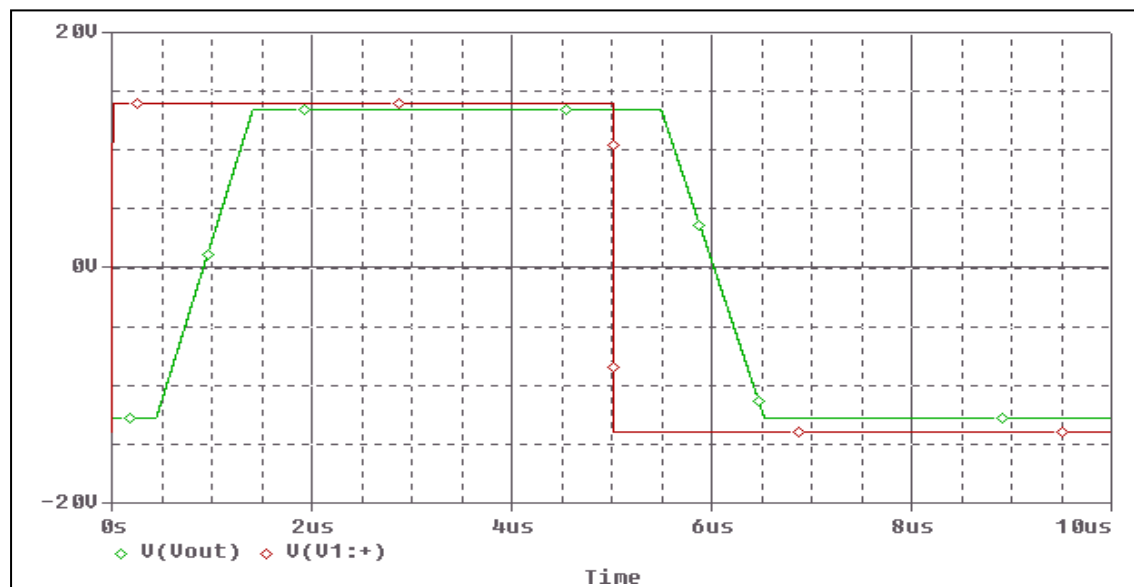
## Slew Rate, +SR, -SR

### Evaluation circuit



The output voltage change versus time (slope) of op-amp when input electric step voltage.

### Simulation result

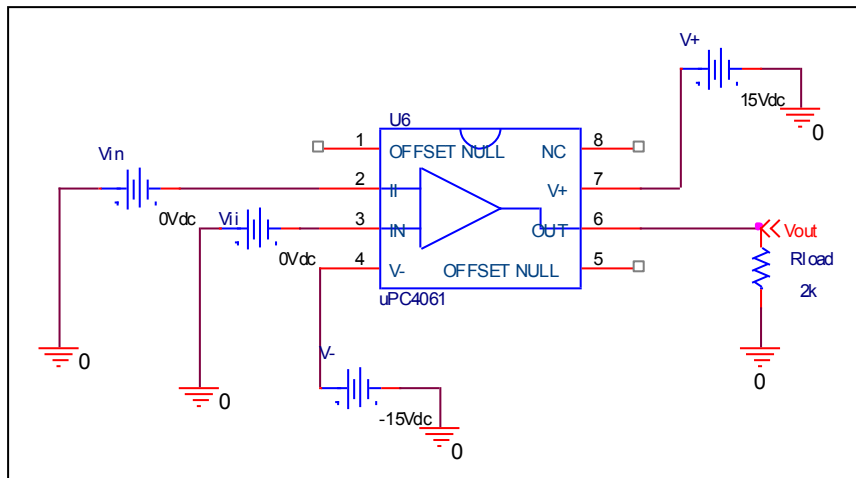


Output voltage change 15V in 1 us (If no good can change **C2** of Spice Model Editor)

Slew Rate(v/us)	Data sheet	Simulation	%Error
		15	15.072

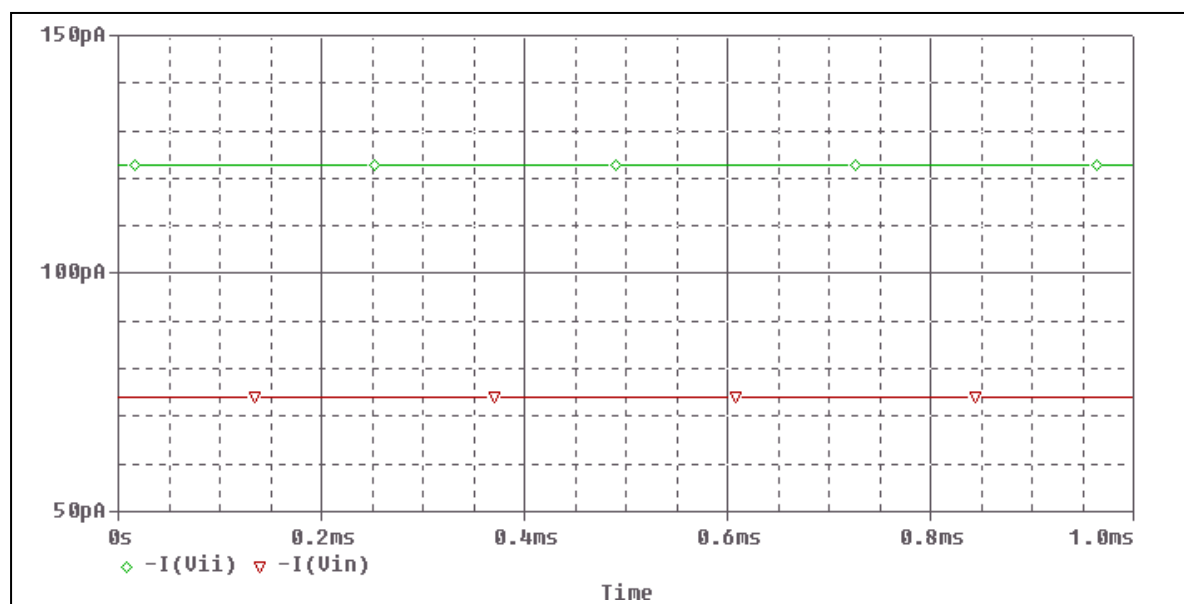
# Input current Ib, Ibos

## Evaluation circuit



The input offset current when supply voltage to op-amp

## Simulation result

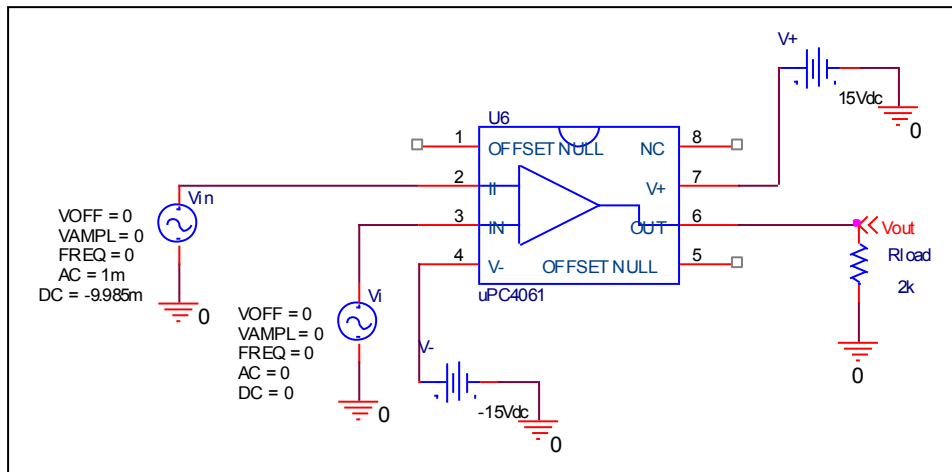


$$I(Vin) = 73.91\text{pA}, I(Vi) = 122.92\text{pA} : I_b = (I(Vin) + I(Vi))/2, I_{bos} = 49.01\text{p}$$

	Data sheet	Simulation	%Error
<b>Ib(pA)</b>	100	98.415	1.585
<b>Ibos(pA)</b>	50	49.01	1.98

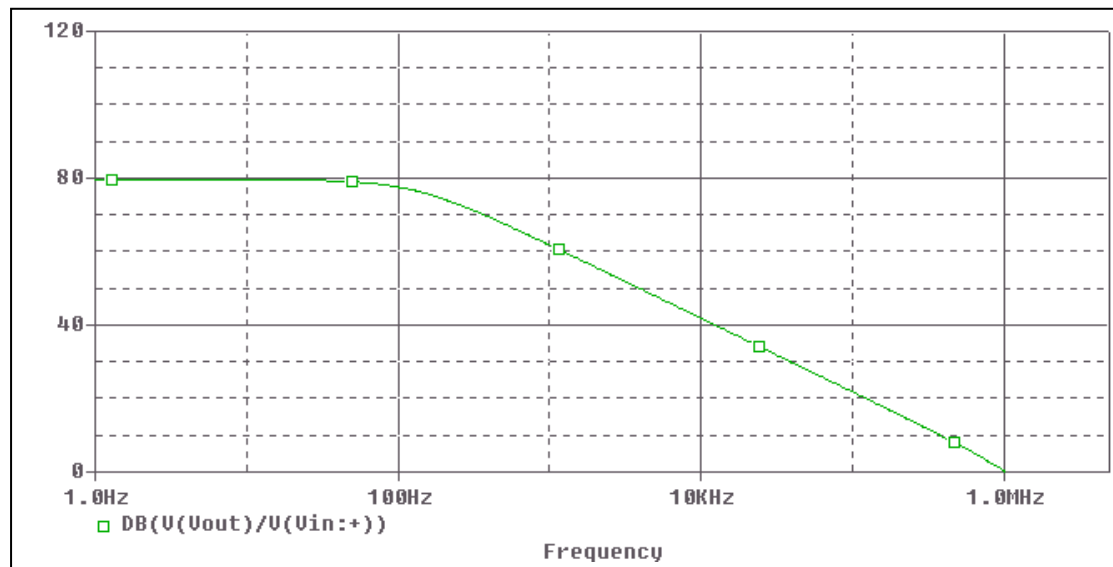
# Open Loop Voltage Gain vs. Frequency , Av-dc, f-0dB

## Evaluation circuit



The open loop voltage gain of op-amp when supply AC input voltage 1MHz frequency

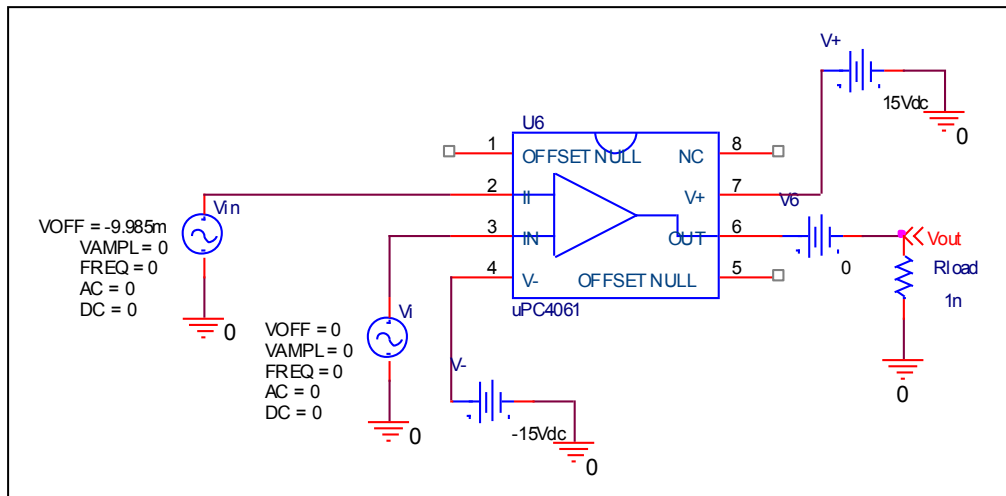
## Simulation result



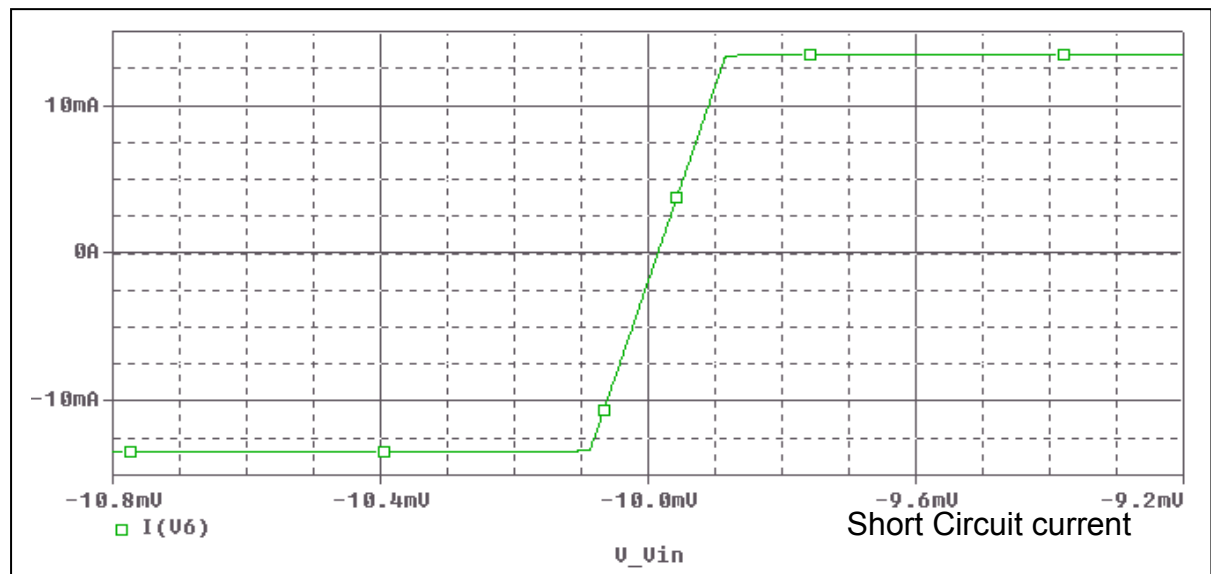
	Data sheet	Simulation	%Error
<b>f-0dB(MHz)</b>	1	1.035	3.5
<b>Av-dc</b>	9000	9555	6.166666667

# Output Short Circuit Current - Ios

## Evaluation circuit



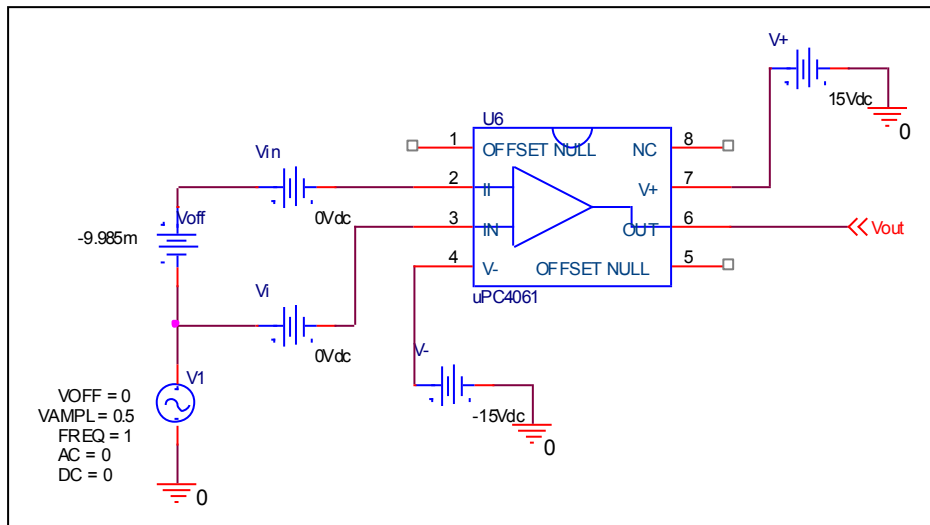
## Simulation result



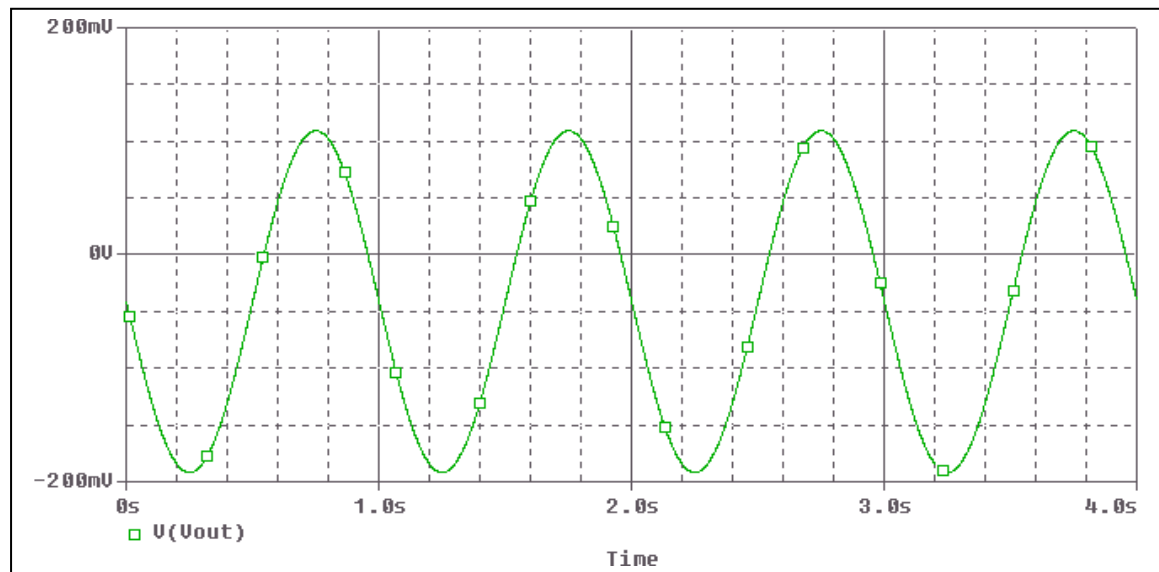
Short Circuit Current	Data sheet	Simulation	%Error
		13mA	13.467mA

# Common-Mode Rejection Voltage gain

## Evaluation circuit



## Simulation result



Common mode gain=0.301/1

Common Mode Rejection Ratio=9555/0.301=31744

CMRR	Data sheet	Simulation	%Error
	31623	31744	0.382632894